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Ill health and its causes, such as poor nutrition, can keep a child from fully exploiting his environment. Important issues to be considered are as follows: (1) functionally important health problems frequently found in children, (2) techniques which identify the children who have problems, (3) treatment most effective to remedy the problems, and (4) resources (financial, manpower, administrative, organizational), to identify, remedy, and prevent the problems. Gaps in basic data governing these issues indicate the need for decisions concerning the content and organization of health programs. Diverse systems should be self-critical with built-in evaluation and monitoring to insure definite knowledge about the effectiveness of their treatment technique and organizational plans. (DO)

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RESEARCH ISSUES

IN THE

HEALTH AND NUTRITION IN EARLY CHILDHOOD

by

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RESEARCH ISSUES IN THE HEALTH AND NUTRITION IN EARLY CHILDHOOD

Ill health is one of the burdens that can keep a child from fully exploiting his environment, whether that environment be impoverished or enriched. For this reason,health and its precursors such as nutrition, must be a major concern in any program aimed at augmenting child development.

But what should be the dimensions of such concern? A "physical" and a vitamin pill? Or perhaps a nurse or physician in every classroom? Thesé extreme characatures illustrate the type of question which I wish to discuss today.

What do we really need to know about health and nutrition to assure that no pre-school child is impaired in his ability to fully exploit his environment? What part of this necessary knowledge is now available for widespread application? What part is still to be discovered and documented? On what part of the unknown should we concentrate our attention either because it is basic to our further understanding or because it appears ripe for rapid solution?

Ideally, one wants to know everything about each problem. But we must have priorities. And, in determining what I will consider as a research issue for this discussion, I have chosen a priority system based largely on social mandate.

To be "important" or an "issue" in this sense, the problem must have three characteristics. It must have a significant impact on the real life function of the child, it must affect a significant number of children and there must be some possibility of intervention that will prevent, cure or ameliorate it. By these criteria, many currently popular research problems don't qualify as "issues" - I would point out that I do not make a distinction between basic and applied research, but between the importance of a social sense of the subjects.

The "Issues" in health and nutrition, as they apply to the pre-school child, lie in the answers to four questions:

1. What are the functionally important health problems to be found with some frequency in a group of children?
2. What techniques will efficiently identify the children who have these types of problems?
3. What treatment or intervention techniques will be most effective in remedying these problems?
4. What resources -- financial, manpower, administrative, organizational, -- will be necessary to prevent, identify and remedy these problems?

I will discuss each of these questions in terms of what is already well enough known to be widely applied, what still needs to be discovered and which parts of the unknown should have the highest priority for exploration in the immediate future.

The first question is, "What are the health problems to be found in a group of young children?"

We are concerned 1) with the gross incidence or prevalence of medical and dental problems in young children, 2) with the functional importance of the problems, 3) with the distribution of these problems in various groups of young children -- especially socio-economically defined groups and 4) with the amount and effectiveness of the care which the children with problems are already receiving.

We have reasonably adequate data about the gross prevalence in a population of pre-school children of the types of health problems that are traditionally identified through screening tests, medical histories, medical examinations and dental examinations. For example, approximately 10% of pre-school children will fail a vision screening test and 1%-3% will require glasses. Seventy to eighty percent of the children in a community without fluoridated drinking water will have dental decay requiring treatment,

while only 30%-40% of pre-school children drinking fluoridated water will show such decay. Congenital heart disease affects 2-5 children per thousand, but at least ten times that many will have heart murmurs for which the examining physician may wish a specialist's evaluation. Such figures are extremely useful for program planning. We know them well enough to disseminate them widely and have done so in our program guidelines.

However, our data are not as useful as they might be. While many medical abnormalities noted on examinations or by laboratory or functional tests are clearly "health problems", there are many other medical conditions or findings which cannot be considered "health problems" because they have no impact on the present or future function of the child. And, there are many other conditions about which we are uncertain.

We have enough data to state, rather categorically, that enlarged tonsils, intact foreskin and the vast majority of umbilical hernias are findings which are not problems. For such conditions, physician and parent pressure for unnecessary treatment rather than the condition itself must be considered to be the real health problem.

The low hemoglobin concentration of iron-deficiency anemia is a frequent finding in poor pre-school children

But, we are not at all certain to what degree, if any, a child with mild anemia is handicapped or even how his anemia can be measured most meaningfully. At what level of hemoglobin is growth, disease resistance or learning ability actually impaired? Or is serum iron or mean corpuscular hemoglobin concentration, not hemoglobin, really the salient variable? Is lowered hemoglobin the mechanism by which iron deficiency impairs function, or just a convenient indicator of the iron-poor state of many enzyme systems, cells and organs? Is iron deficiency anemia a useful index of other nutritional deficiencies -- vitamins, protein, other minerals -- or a function largely independent of other nutritional variables? Is anemia or low serum iron in the pre-school child an indicator of inadequate concurrent dietary iron intake or really primarily a residuum of the widespread sub-marginal iron intake which is known to occur in the first year of life?

Answers to such questions are both easy to obtain and of enormous practical importance. If the mild degrees of iron deficiency anemia, which are present in so many Head Start children, actually impair their health or function, as seems likely, then simple and cheap preventive and curative intervention on a national scale through iron supplementation could

PS001655

have a tremendous impact. If such low hemoglobin and serum iron values are merely interesting laboratory findings with no functional importance, then such intervention is clearly unjustifiable.

If we know little about the effects and interrelations of iron deficiency anemia, we know even less about deficiencies of other nutrients except when these occur in their most gross states. When measured against such arbitrary standards as the Recommended Daily Allowances, the diets of a huge proportion of our child and adult populations are considered "inadequate". Are children and adults with such diets actually functionally impaired in some way? Or are such statistics merely a reflection of unrealistic recommended daily allowances? If dietary histories and standards are of limited importance, we might expect something better of biochemical measurements of nutritional status. Such studies are just beginning to take place on populations of children living in the United States, and those that have been reported, reveal very little measurable malnutrition, even in groups of children in the most abject poverty in America. But, of course, biochemical measurements have the same limitations I have discussed previously for hemoglobin. At what

level can a biochemical measurement be considered abnormal, inthat it is associated frequently with abnormal function? Do biochemical measurements actually correlate with dietary intake? Does intervention with foodstuffs or with vitamin or mineral supplements actually affect the biochemical measurements or the functional abnormality? We can certainly justify nutritional programs on humanitarium and aesthetic terms, but the very existence of functionally important malnutrition in the United States remains an open question.

"Speech problems" are reported with high prevalence in groups of young children. But when is a speech problem functionally important and when does it become an issue -- by our definition -- because there is some possibility of useful intervention? Many pre-school children have immature articulation patterns which have been shown to change to normal speech between age 5 and age 7 without special intervention, and for which the special skills of the speech clinician have been shown to be unnecessary. Is the remarkable diminution of such articulatory speech problems at these ages just a matter of passage of time? Or is it the new social setting of school, or perhaps the amount of attention payed in the first years of school to translating vocalized sounds to

written symbols? It seems quite possible that children learn to articulate clearly as they learn to read, and this could have major implications for improving more serious speech disturbances at younger ages, for children whose first years of school do not teach them to read, and for what is considered as "readiness" for either reading or speech training.

Besides articulatory speech problems, many children have speech and language patterns which conform to sub-cultural pronounciations and usages rather than to standard English, while others have speech or language impaired by abnormalities of the hearing or speech apparatus or associated with abnormal central nervous system function. Does dialectal pronunciation interfere, per se, with function or learning? How frequent are the various structural impairments and which interventions work?

The incidence of "mental health problems" discovered in a group of pre-school children depends almost entirely upon the orientation of the examiner. Unfortunately, there are few normative data available about the behavior of poor pre-school children, nor is there much data available to suggest which types of behavior in a pre-school child predict the behavior and learning problems which are so common in later school years. Intervention or treatment

techniques with proven effectiveness are also lacking. Should an opinion, even that of an expert, that a child is "abnormal" be considered to represent a health problem when "normal" is undefined and there is no evidence that what is being called "abnormal" can be modified or even that it will cause any future problem?

There is widespread opinion that structural or functional abnormalities of the central nervous system, related to biological events in pregnancy, child birth, and early childhood, are a major contributing cause of a substantial proportion of the behavior and learning disabilities manifested by school-age children. There is also widespread opinion that children with such neurologic abnormalities can be discovered in infancy or early childhood by various tests of neurologic function, and that specific types of educational intervention, or even drug treatment, can substantially decrease the later burden of learning and behavior problems. But, despite the proliferation of publicity and of institutionalized intervention programs, we do not yet have knowledge which clearly links learning and behavior disabilities with insults to the central nervous system, we do not have tests which validly predict which groups of children will later show learning disabilities, and we no not have intervention techniques of proven effectiveness in improving the function of such children. These examples

show that the definition of what is a health problem is no easy task.

How are health problems distributed within the population of young children? The Negro-White differences in incidence so frequently noted in this country are presumably based largely on socio-economic status rather than race, per se. In Great Britain, where race is constant but socio-economic status is routinely recorded in health records, there is strong evidence that low socio-economic status is associated with a higher incidence and prevalence of many health problems. Most dramatically, serious lower respiratory infection is ten times more common in children of the lowest socio-economic status than in children of the highest socio-economic status. What mechanisms mediate this difference? It is not simply exposure to infectious agents, for the same viruses are found with approximately the same incidence in all social groups; and it is not medical care, per se, because physicians have essentially no effective tools for preventing or modifying these viral lower respiratory infections. Is it nutritional status? Anemia? Physical activity? Or other child rearing practices? Or, is it combinations of many contributing factors? If the incidence of such serious lower respiratory disease in the entire population could be

lowered to the incidence of the higher socio-economic class, a substantial proportion of infant and childhood mortality, and an even larger proportion of infant and childhood morbidity and hospitalization would be prevented. And if we understood the mechanisms by which social class exerts its influence, we might be in a better position to break the cycle of poverty.

What proportion of children will already be receiving adequate care is an important consideration in program planning. In Head Start, about 80% of the health problems found were newly discovered during the Head Start program; about 25% of these were not thought to require further care. Other studies have shown that about 40% of children with chronic handicapping illness were receiving no care or inadequate care. Some investigations into the reasons for such lack of care will be discussed later in this paper.

In summary, in answering the question "What health problems will be found in a group of preschool children?", we have adequate information on the gross incidence and definition of many problems. We are in need of much clearer information about the incidence and functional importance of anemia, poor nutrition, speech problems and the precursors of behavior and learning problems. And we need vastly

more knowledge of the mechanisms through which socio-economic status affects the incidence and severity of disease.

The questions about anemia and speech problems seem ripe for almost immediate solution because tools and concepts to provide the necessary answers are already in hand.

The second major question under which I categorize our research needs is: "What techniques will efficiently identify the children who have functionally important health problems?" Once health problems have been defined, there are several possible ways of identifying individual health problems in individual children. The most obvious is the traditional medical evaluation or "history and physical" performed by a physician. Screening tests performed by non-physician personnel, discover certain health problems. Parents may complete questionnaires or be interviewed by non-physician personnel to identify health problems. Teachers may identify health problems either by completing standard questionnaires or check-lists or by noting and referring individual children with deviant behavior or parent health problems.

The physician's, dentist's, or other specialist's examination has traditionally been considered the most

certain way of identifying health problems, and it is usually the standard against which the screening tests, questionnaires or other identification techniques are judged. The physician's evaluation can be thought of as a series (or a branched program, if you like) of individual questionnaire and examination items, each of which is capable of discovering a certain proportion of certain types of health problems.

Which parts of the history or examination are most effective in discovering what kind of health problems, in a group of pre-school children, is largely unstudied and unknown. And the reliability and validity of each item in the history and physical are largely unstudied.

Screening tests are procedures that can be applied to entire groups to identify individuals who are at high risk of having specific health problems. They must be inexpensive both in material costs and in costs of professional time and must usually be reliable in the hands of non-physician personnel. The tuberculin test is an almost ideal example. It is cheap and can be administered and read with minimum training; it validly identifies a population with a high risk of disease and gives very few false positives or false negatives. The screening test for

anemia can be technically reliable and valid, but we have yet to form an adequate definition of iron deficiency anemia. The routine urinalysis produces such a high yield of abnormal tests in relationship to the number of treatable medical problems finally discovered, that many doubt whether it has any usefulness whatsoever as a screening test,at least in childhood. Quantitative urine culture appears efficient and effective in discovering important urinary tract infections.

Despite long and widespread use of such vision screening tests as the Snellen Illiterate E Wall Chart, its precise usefulness is still questionable. We know that 8% - 10% of children of the pre-school age will fail to pass the screening test. We do not know what proportion of the children found abnormal by the screening test will actually benefit from early discovery or treatment, nor is it clear how many children will be missed by such a test who actually might benefit from such early treatment. It is possible that non-testability, or inability to learn the task presented to the child by this chart, will be a better screening test for learning or reading disabilities in school than is the chart as currently used to detect defects in visual acuity.

There is, I believe, substantial data in the literature about what errors and substitutions in speech are made by children with impaired speech, due to different causes. The speech of a deaf child is different from that of a child with athetosis and different from that of children with so-called problems developmental articulation, or with dialectal pronunciation. This information, if systematized and disseminated, could allow physicians, teachers and even speech clinicians to more accurately assess children and could probably be the basis for screening tests applied by non-professionals.

Questions posed to parents on a printed questionnaire or by a non-professional interviewer can discover a large number of children with health problems. One household survey revealed that nearly 50% of the children under six were considered by their parents to have some handicapping condition. Clinical examination confirmed the presence of some abnormality in 80% of such children, while only 32% of the children considered normal by their parents showed any abnormality on examination. Most of the conditions found on examination would not be considered "health problems" by the criteria I am using today, but nearly 20% of the children reported by their parents did have a condition which caused a moderate or severe

functional handicap.

Teachers, with their prolonged chance to observe children in close proximity to other children of the same age, and usually of the same social class, should be in a better position than the parents,or even physicians, to identify children whose appearance or behavior deviates from that of other children. The effectiveness and efficiency of such screening by teachers should be quantitatively evaluated.

Easily applied reliable criteria for identifying children with learning problems or behavior problems or with a high probability of developing such problems in the future would be of enormous usefulness. Screening tests for retarded or distorted behavioral development have been devised and used widely, but their predictive validity has not been established.

In summary, we appear to have adequate tests for identifying tuberculosis, anemia, urinary tract infection and hearing loss. With current knowledge we are in an excellent position to develop much better tests for remediable speech defects and for vision problems.

The physician's history and examination, while pragmatically clearly extremely useful, can certainly be refined and made much more precise and efficient by systematic studies of what questions and what

examinations yield what type of information about what kinds of health problems. Parent and teacher's questionnaires show great promise in identifying health problems but require scientific validation. Tests or examinations which validly identify or predict behavior or learning problems would be of the utmost usefulness.

The third major question, under which I categorize the research issues in child health, is "What treatment or intervention techniques will be most effective in remedying the problems as defined and discovered?" Discovering health problems or defects is of only academic interest if no methods exist to treat or alleviate the conditions discovered. Of course, treatment or alleviation need not imply complete cure. For example, careful explanation to a parent of the benign nature of a previously identified heart murmur does nothing for the heart murmur. But it may relieve a great deal of parental anxiety and may remove unrealistic inhibitions placed on the child's activities.

The treatment of primary tuberculosis of childhood represents a situation in which data are sufficient to make most of the necessary judgements. Once a young child has been shown to have a positive tuberculin test, his chances of developing progressive pulmonary or extrapulmonary tuberculosis, though small,

are quite real and predictable. Treatment with isoniazid reduces this risk by 75% to 80%. The cost of isoniazid treatment is easily predictable, and the risks of treatment are both well known and extremely small in magnitude. When such knowledge is available, the cost and risks of treatment can be compared directly with the cost and risks of not treating, and a rational decision can be reached (in this case, almost always in favor of treatment).

But for most medical conditions, knowledge of the risks is not nearly so clear. Bronchial asthma is a frequent and distressing cause of disability in children. While immediate symptomatic treatment can always be justified, the justification for long-term treatment is not so clear. The course of the disease, when no long-term treatment is applied, is not accurately known or predictable, even in a statistical sense. The effectiveness of each type of treatment - hyposensitization, environmental controls, dietary restrictions, medications - is not known, nor are the risks and costs of each type of treatment or combination of treatments known. The decision for or against any type of long-term treatment for bronchial asthma must,therefore, be based on much weaker evidence than that which is available for such conditions as tuberculosis. Perhaps this is the state of knowledge

we have about the majority of medical conditions.

For other conditions, widely used therapeutic techniques not only have inadequate supporting data, but have a considerable amount of data showing that they are ineffective. Tonsil and adenoidectomy and umbilical hernia repair have already been mentioned. Many studies have tried to establish the effectiveness of psychotherapy in relieving psychiatric or behavior disorders. The majority of such studies have not shown psychotherapy to be effective. Special classes for children with various educational problems have become widespread phenomenon, yet there is very little evidence that segregating children with special learning problems from their peers results in more learning for either group. Corticosteroid treatment of many allergic conditions is known to be actually harmful. The great pressure to "do something" when faced with a problem is responsible for the perpetuation of many techniques which are unsupported, or even contradicted, by scientific evidence. And it is true that in the real world decisions must be made, even in the face of scientific uncertainty.

The question of what is effective treatment is one that is constantly asked by current researchers and many of our answers will come from currently supported research. As long as we lack precise data

on relative risks and benefits of intervention for many conditions, our most important need may be that every physician or other therapist, and every program which employs therapy must constantly evaluate and re-evaluate himself, not only in terms of what he has done, but in terms of how what has been done has affected the actual health and function of the children involved.

The fourth major question is "<u>What resources - financial, manpower, administrative, organizational - will be necessary to prevent, identify and remedy important health problems as they exist in a group of children?</u>"

We know almost nothing about the financial cost of protecting and enhancing a child's health. Estimates have ranged from fifteen or twenty dollars per child per year to three hundred dollars or more per child per year. Head Start spends about seventy dollars per child per year on medical and dental services, but this figure represents an average. Some Head Start programs are able to pay for health services almost entirely with funds available from other sources or with free services already available in the community. Others must purchase nearly all services on the open market. Some Head Start programs actually succeed in getting all needed preventive measures,

examinations to discover health defects and all needed remedial and continuing care to 100% of their children. Other programs miss many children, thus markedly reducing their costs. Head Start medical and dental services usually must make up for a backlog of medical and dental care needs.

I know of no studies of the actual total costs to bring all needed health services to all children in a defined community. Planners, legislators, insurance companies and even parents are desparately in need of such information. It seems likely that a total annualized cost would fall someplace between one hundred and two hundred dollars per child.

How many health workers with what kind of training will be necessary to provide such services? A pediatrician in private practice supported by one or two ancillary workers usually cares for the children of approximately one thousand families. Do the health needs of children seen in private practice require approximately the same amount of effort as the health needs of children in other parts of our population? Could the pediatrician extend himself to care for more children by hiring more helpers or by delegating more parts of his job to his present helpers? Are helpers with new kinds of training needed? Current opinion

would answer each of these questions "yes", but current opinion is not based on any scientific evidence.

Or is it possible that many of our methods of approaching health problems through medical and dental services are not really the best ways at all? A single dose of measles vaccine provides more than 96% certainty that the vaccinated person will not experience measles at any time in the future and, therefore, that he will not require physician care for measles, nursing care for measles, medication for measles or any other services for measles. The total costs of health care for children can, therefore, be substantially reduced, simply by assuring that every child receives immunization.

The addition of fluoride to water supplies reduces the incidence and severity of dental decay by 50-70 percent, drastically revising the need for dental manpower and the cost of dental treatment. Clearly, every child health problem must be addressed, not only in terms of how can we care for it but how can we arrange circumstances so the need for care is obviated.

Will broad social programs in housing, income maintainance, employability assurance and education actually bring the health care needs of all of our population down to the low level enjoyed by its present

most affluent members? Can health education, which seeks to get parents and children to eat nutritious foods, seek preventive medical care and early treatment for health problems, prevent accidents, promote personal cleanliness, toothbrushing, etc., actually improve health and reduce health care needs? Or do such educational programs actually have no impact on the way children and adults behave? Up to the present time we don't know, but traditional educational approaches are not well supported by either measurements of their results nor by theoretical analysis of their techniques in the light of modern learning concepts.

We do know, from experience and research, that health <u>care</u> behavior can be changed. When unmet health needs are discovered in a population, the first response of most professionals is to blame the individuals who are not obtaining the necessary care. When children are involved the parents are blamed. The failure to obtain recommended and necessary health care, often attributed to "parent apathy", is actually the product of several realistic barriers which can be overcome, but only by special efforts. The attitude of parents of low socio-economic status toward health care appears to be similar to the attitude of people of more fortunate background. Their participation

in health care is lower because they have many other needs of higher immediate priority, and because the services offered the medically indigent population in most communities are inaccessible in terms of time and distance, expensive in terms of time and money and often unacceptable in terms of human dignity. Widespread experience indicates that when health services are made convenient, available, and accessible and are administered in a way to protect the time, money and dignity of the recipients, they are avidly utilized by populations previously called "unreachable".

It seems likely that it is not the attitudes, expectations and priorities of those who fail to obtain medical care that need to be changed, so much as the attitudes, expectations and priorities of the providers of medical care. We certainly know as little about effective techniques for provider education as we do about effective techniques for consumer education. But experience, which cannot yet be considered scientific evidence, does suggest that when the planners, providers and organizers of medical care are advised by formally organized groups of consumers or recipients, the services provided are changed and become more widely utilized. And when providers are placed in an administrative setting which allows them, or forces them, to modify their

activities experimentally, they accept and act on the results of the experiment. As an example, the cardiology clinic of a children's hospital instituted telephone reminders, personalized reception of patients, staggered appointments and continuity of patient-physician relationships and reduced its incidence of missed appointments from 50% to 10%.

Many commentators, when faced with populations which do not practice all recommended nutritional, preventive medical or health care practices, state blandly that the problem is "educational". If they mean that the dissemination of information and the use of motivational tricks will make the people behave the way experts think they ought to behave, such commentators are clearly wrong. But,in another sense, the problem is one of education or learning. In its most global definition, education is the modification of behavior through experience -- as such, it describes a feedback system in which results are evaluated against goals and behavior reinforced or extinguished accordingly. And such feedback systems, learning systems, or educational systems do, I believe, represent the real answers to our problems. The experts must learn to acquire and interpret the data about where the real problems of health and health care lies. Each provider and recipient must learn to

interpret his own successes and mistakes. Organizers and educators must learn to provide environments in which such feedback and learning can take place. And we all must learn how to persuade both individuals and political bodies to act responsively to factual data.

Today I have discussed research issues in the health and nutrition of pre-school children under four categories; the answers to the four questions one must ask in planning to meet the health needs of any group of children.

What are the functionally important health problems to be found with some frequency in a group of children? Many are well defined and easy to count, and for some of these we have relatively good counts. While we know that the prevalence of many health problems is related to socio-economic status, we know practically nothing about the mechanisms by which this relationship is mediated. There are certain health findings -- for example anemia, poor dietary history and certain deviations of behavior and speech -- that we are reluctant to label as health problems until we have much more evidence about their actual functional consequences. There are certain health problems, especially the behavior and learning problems of school aged children, that we would like to be able

to define in terms of findings at a much earlier age.

What techniques will efficiently identify those children who have functionally important health problems? We have a handful of effective and efficient screening tests, as well as several that are widely used but need much further definition in terms of reliability and validity. The series of tests and questionnaire items which are strung together in a physician's history and physical examination certainly falls into the category of tests whose reliability and validity needs vastly more study. All of the descriptive and predictive tests of behavior and learning, as well as of nutrition and speech, clearly fall into the same category.

What treatment or intervention techniques will be most effective in remedying these problems? This is the realm of traditional medical research, and we know a great deal about many of the specific health problems which are to be found in children. However, rarely are we able to critically weigh costs and benefits of one form of treatment against the costs and benefits of another form of treatment or of no treatment at all. And much of the data we will need to make such logical decisions will come from studies of the natural history of illness and from double blind studies of various forms of intervention, rather than

from the currently popular studies of molecular biology and pathophysiology. A continuing problem is the perpetuation of ineffective intervention techniques - bed rest, tonsillectomy, much psychotherapy -- because of the humanistic urge to "do something to help", even when we don't know that what we do actually helps.

What resources - financial, manpower, administrative, organizational - will be necessary to prevent, identify and remedy these problems in a population of children? Given current techniques and organizations we seem to require one children's physician for every one thousand families with children and between one hundred and two hundred dollars a year in finances. The opportunity for reallocation of tasks between the doctor and his helpers and for new organizational and financial settings is enormous. The tools to measure the effectiveness and efficiency of such changes are weak and need much greater development. We do know that utilization of whatever services are available can be greatly enhanced by making these services responsive to the real needs of the recipients or clients.

I have discussed the type of basic data necessary to plan a completely rational program for child health, and I have pointed out some of the gaps in

existing knowledge. With such gaps in basic knowledge, it is hardly surprising that there is criticism and debate about what methods will best achieve better health and function for young children. But gaps in knowledge and a lack of organizational models of proven usefulness cannot prevent the need for pragmatic decisions about the content and organization of programs to meet the health needs of pre-school children.

Such imperfect knowledge does dictate that diversity of program content and organization is highly desirable, both in adapting to local conditions and in testing and proving new methods. It also dictates, or should dictate, that each of the many diverse patterns and programs which develop must build into themselves evaluation and monitoring systems that can lead both to program improvement and to more definite knowledge about the effectiveness of treatment techniques and organizational plans.

Perhaps our greatest research need is for tools and motivational arrangements that will assure that every practitioner of child health and every organization involved in the promotion of child health can and does fully evaluate his own results in terms which describe the real issues, and does modify his programs in terms of this evaluation.

John Gardner has described the self-renewing individual or institution as one who is constantly aware of his actual problems and operating results and is constantly developing new resources to deal with the ever-changing situation.

Perhaps the Gardner concept of Self Renewal is what we need most, both in providing today's services and in defining tomorrow's research issues in child health.